

**COUNTY OF KAUAI**

**GOVERNMENT OPERATIONS  
INVENTORY OF GREENHOUSE GASES  
CALENDAR YEARS 2007-2011**

**WORKING DRAFT**

**PREPARED BY**

**OFFICE OF ECONOMIC DEVELOPMENT  
OCTOBER 2012**



***Holo Holo 2020***

*Growing Kaua'i responsibly.*

## ACKNOWLEDGEMENT

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## DEFINITIONS<sup>1</sup>

**Carbon dioxide (CO<sub>2</sub>):** A naturally occurring gas, which also is emitted from human activities such as burning fossil fuels and biomass, land-use changes, and industrial processes. It is the principal anthropogenic greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a global warming potential of 1.

**Carbon dioxide equivalent:** A measure used to compare the emissions of the different greenhouse gases based upon their global warming potential (GWP). Greenhouse gas emissions in the United States are most commonly expressed in million metric tons of carbon dioxide equivalents (MMTCO<sub>2</sub>Eq).

**Diesel fuel oil:** A fuel composed of distillates obtained in petroleum refining operation or blends of such distillates with residual oil used in motor vehicles. The boiling point and specific gravity are higher for diesel fuels than for gasoline.

**Fossil fuel:** A general term for buried combustible geologic deposits of organic materials, formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils by exposure to heat and pressure in the earth's crust over hundreds of millions of years.

**Gasoline:** A light, liquid hydrocarbon oil typically used to fuel internal combustion engines.

**Greenhouse gas (GHG):** Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrochlorofluorocarbons (HCFCs), stratospheric ozone (O<sub>3</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>).

**HCEI:** Hawai'i Clean Energy Initiative. A federal-state-private sector partnership with a goal of achieving 70% clean energy by 2030, with 30% from efficiency measures and 40% from locally generated renewable sources.

**KIUC:** Kaua'i Island Utility Cooperative, a member-owned electric utility on the island of Kaua'i, state of Hawai'i.

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<sup>1</sup> ICF International. 2008. Hawai'i Greenhouse Gas Inventory: 1990 and 2007. Dept. of Business, Economic Development and Tourism.

## INTRODUCTION

In 2007, the County of Kauaʻi via Mayor Bernard P. Carvalho supported the current scientific evidence and view that climate change was and is a serious threat to the environment and economic health of our communities by authorizing the County's support of the U.S. Conference of Mayors Climate Protection Agreement. As a follow up action, the County joined ICLEI USA, Local Governments for Sustainability in August 2012, and has embarked on a program to benchmark its carbon emissions, using 2007 as the baseline year. The County then plans to formulate an action plan to reduce government operations greenhouse gas (GHG) emissions. Both the carbon emission inventory and the action plan will be refined further as data collection improves over time to provide the proper metrics to gauge performance.

This Inventory of Greenhouse Gases report was prepared by Glenn Sato, Sustainability Manager, Office of Economic Development, with assistance from special consultant Ken Stokes from Island Matters, LLC and input from the Mayor's Management-level Green Team, consisting of relevant members of key departments with direct resource use information and those that can directly impact the County's carbon footprint generated from local government operations. The intent of this Greenhouse Gas Emissions Inventory includes:

1. The creation of an initial baseline following a simple standardized formula for calculating GHG emissions following an internationally recognized protocol;
2. Highlighting the County's emissions and associated costs from local government operations;
3. Creating data-supported GHG targets that County agencies can use to reduce their carbon footprint by maximizing their efforts in key areas; and
4. Taking the first steps in becoming a more sustainable county government that can lead by example and create a community-wide effort at becoming more sustainable and reducing the island's carbon footprint.

Due to limited staff time, resources and the lack of sufficient data to complete a comprehensive report, the County of Kauaʻi used ICLEI's Quick Action Inventory reporting option. Although the report does not cover every source of GHG, it does capture the majority of emissions from the County's operations through documented electricity billing information and bulk fuel purchases. This document is seen as a working draft that will evolve over time. The County intends to improve and refine the data collection processes through additional data collection methods, and through the use of smart meters, energy management software and better fuel management and tracking programs. Sustainability is seen as a journey of continuous improvement and county participants will be encouraged to join the journey at any time.

Calendar Year 2007 was selected as the baseline year to match the *State of Hawai'i's Greenhouse Gas Inventory Report -1990 and 2007*. Hawaii's Greenhouse Gas Emissions Reduction Law, Act 234, was signed into law by Governor Linda Lingle on June 30, 2007, and

became effective July 1, 2007. Act 234 aimed to establish and cost-effectively achieve the State policy of greenhouse gas (GHG) emissions reductions and limits at or below the best estimates and updates of the inventory levels of GHG emissions for 1990, by January 1, 2020. To achieve this purpose, Act 234 required that the Hawai'i Department of Business, Economic Development, and Tourism (DBEDT) and the Department of Health (DOH) update the Inventory of Hawaii's Greenhouse Gas Emissions Estimates for 1990, by December 31, 2008. ICF International was hired by DBEDT in July 2008 to update estimates of 1990 emissions presented in the Inventory of Hawaii Greenhouse Gas Emissions. The Updated Inventory included revised estimates for 1990 and newly developed estimates for 2007.

This Government Operation Greenhouse Gas Emission Inventory Report provides an overview of the island of Kauai; highlights the State Hawai'i Clean Energy Initiative; Kaua'i Island Utility's commitment towards more clean energy; identifies energy costs and greenhouse gas emissions from Kaua'i County government operations; and quantifies its measurable carbon emissions footprint.

## SECTION 1

### KAUAI OVERVIEW

#### General

This section is meant to give the reader who is unfamiliar with the island of Kaua‘i, a very brief overview of the island to provide some perspective as they familiarize themselves with the carbon emissions study.

#### Geology and Population

The island of Kaua‘i is geologically, the oldest of the main Hawaiian Islands. It is fourth largest of the main Hawaiian islands, with an area of 562.3 square miles. Also known as “The Garden Isle”, Kaua‘i is home to one of the wettest spots on earth...Mt. Waialeale, with an average annual rainfall of 460 inches. Kaua‘i’s 2011 population was 67,701 based on an estimate from the U.S. Census Bureau<sup>2</sup>.

#### Climate and Rainfall

The Hawaiian Islands have one of the most diverse rainfall patterns on earth. The mountainous terrain, persistent trade winds, heating and cooling of the land, and the regular presence of a stable atmospheric layer at an elevation of around 7,000 ft. interact to produce areas of uplift in distinct spatial patterns anchored to the topography. The resulting clouds and rainfall produced by this uplift lead to dramatic differences in mean rainfall over short distances.<sup>3</sup>

The average annual temperature of Līhu‘e, Kaua‘i, the seat of county government is 75 degrees Fahrenheit. Mean annual rainfall (inches) for the island of Kaua‘i is shown on the isohyets map below and averages about 50 inches per year. Tables 1-4 also provides temperature, heating and cooling degree days, precipitation and other weather information for Līhu‘e.<sup>4</sup>

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<sup>2</sup> U.S Census Bureau, Kaua‘i County Quick Facts. June 7, 2012.  
(<http://quickfacts.census.gov/qfd/states/15/15007.html>)

<sup>3</sup> Giambelluca TW, Chen Q, Frazier AG, Price JP, Chen Y-L, Chu P-S, Eischeid J., and Delparte, D. 2011. The Rainfall Atlas of Hawai‘i. <http://rainfall.geography.hawaii.edu>

<sup>4</sup> Giambelluca TW, Chen Q, Frazier AG, Price JP, Chen Y-L, Chu P-S, Eischeid J., and Delparte, D. 2011. The Rainfall Atlas of Hawai‘i. <http://rainfall.geography.hawaii.edu>



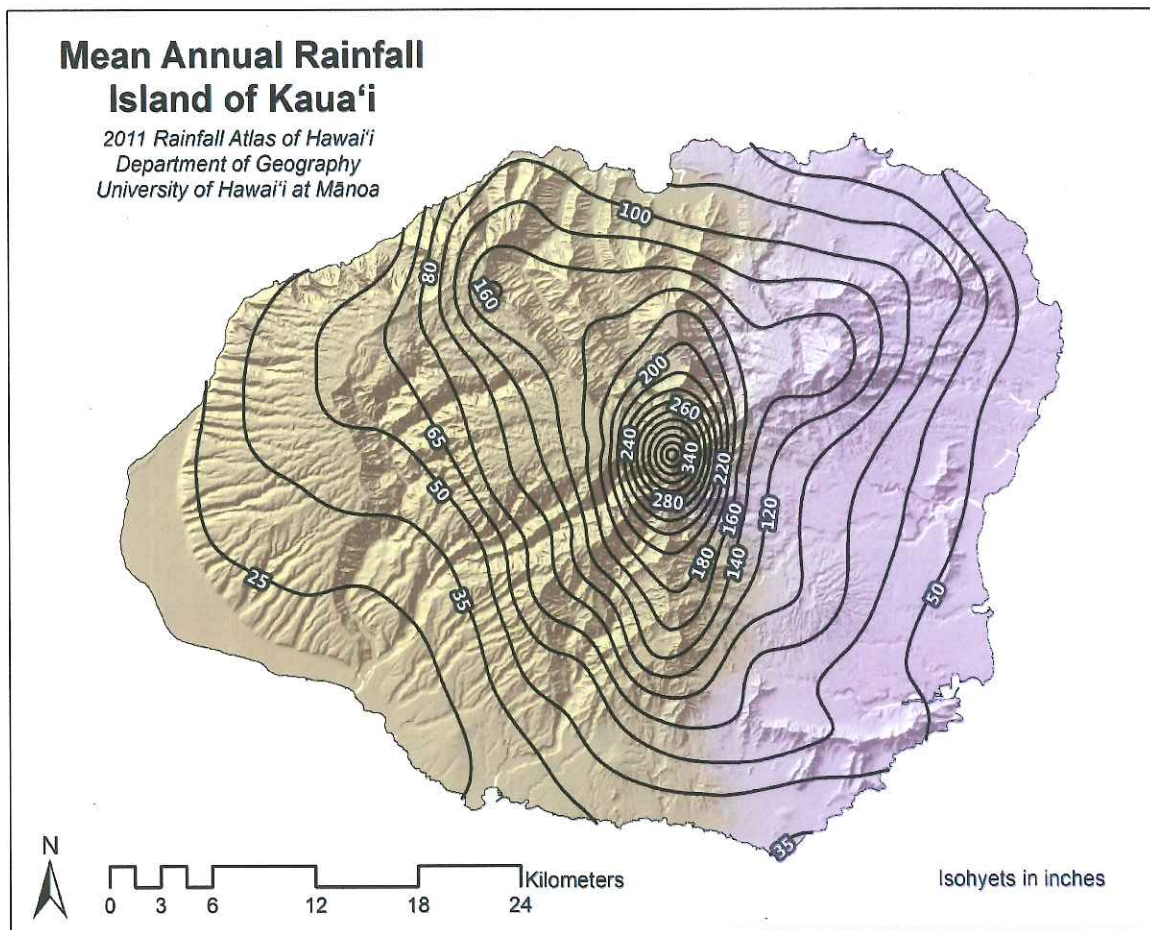


Figure 1 Mean Annual Rainfall: Kauai

## Lihue

Tables 1 to 4 below display average monthly climate and weather indicators in Līhu'e, Kaua'i, Hawaii.

### Table 1

Temperature by: Fahrenheit

| <b>Lihue<br/>Temperature</b> | <b>Jan</b> | <b>Feb</b> | <b>Mar</b> | <b>Apr</b> | <b>May</b> | <b>Jun</b> | <b>Jul</b> | <b>Aug</b> | <b>Sep</b> | <b>Oct</b> | <b>Nov</b> | <b>Dec</b> | <b>Annual</b> |
|------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|---------------|
| Avg. Temperature             | 71.6       | 71.6       | 72.7       | 74.0       | 75.8       | 77.8       | 78.9       | 79.5       | 79.2       | 77.6       | 75.5       | 72.9       | 75.6          |



|                                      |      |      |      |      |      |      |      |       |       |       |      |      |      |
|--------------------------------------|------|------|------|------|------|------|------|-------|-------|-------|------|------|------|
| Avg. Max Temperature                 | 77.9 | 78.1 | 78.5 | 79.5 | 81.2 | 83.1 | 84.1 | 84.8  | 84.8  | 83.2  | 80.7 | 78.6 | 81.2 |
| Avg. Min Temperature                 | 65.3 | 65.1 | 66.9 | 68.5 | 70.3 | 72.5 | 73.7 | 74.2  | 73.5  | 72.0  | 70.3 | 67.1 | 70.0 |
| Days with Max Temp of 90 F or Higher | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | < 0.5 | < 0.5 | < 0.5 | 0.0  | 0.0  | 0.0  |
| Days with Min Temp Below Freezing    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 0.0   | 0.0  | 0.0  | 0.0  |

**Table 2**

|                                  |            |            |            |            |            |            |            |            |            |            |            |            |               |
|----------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|---------------|
| <b>Lihue Heating and Cooling</b> | <b>Jan</b> | <b>Feb</b> | <b>Mar</b> | <b>Apr</b> | <b>May</b> | <b>Jun</b> | <b>Jul</b> | <b>Aug</b> | <b>Sep</b> | <b>Oct</b> | <b>Nov</b> | <b>Dec</b> | <b>Annual</b> |
| Heating Degree Days              | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0           |
| Cooling Degree Days              | 209        | 188        | 239        | 270        | 335        | 384        | 431        | 450        | 426        | 391        | 315        | 245        | 3883          |

**Table 3**

|   |            |            |            |            |            |            |            |            |            |            |            |            |               |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|---------------|
| <b>Lihue Precipitation</b>                | <b>Jan</b> | <b>Feb</b> | <b>Mar</b> | <b>Apr</b> | <b>May</b> | <b>Jun</b> | <b>Jul</b> | <b>Aug</b> | <b>Sep</b> | <b>Oct</b> | <b>Nov</b> | <b>Dec</b> | <b>Annual</b> |
| Precipitation (inches)                    | 5.9        | 3.3        | 4.2        | 3.5        | 3.1        | 1.7        | 2.1        | 1.8        | 2.4        | 4.4        | 5.5        | 5.2        | 43.0          |
| Days with Precipitation 0.01 inch or More | 15.0       | 13.0       | 16.0       | 17.0       | 16.0       | 17.0       | 20.0       | 18.0       | 16.0       | 18.0       | 18.0       | 17.0       | 200           |
| Monthly Snowfall (inches)                 | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0           |

**Table 4**

| <b>Other Lihue<br/>Weather Indicators</b> | <b>Jan</b> | <b>Feb</b> | <b>Mar</b> | <b>Apr</b> | <b>May</b> | <b>Jun</b> | <b>Jul</b> | <b>Aug</b> | <b>Sep</b> | <b>Oct</b> | <b>Nov</b> | <b>Dec</b> | <b>Annual</b> |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|---------------|
| Average Wind<br>Speed                     | 11.0       | 11.6       | 12.7       | 13.4       | 12.8       | 13.2       | 13.7       | 13.1       | 11.7       | 11.6       | 12.4       | 11.9       | 12.4          |
| Clear Days                                | 8.0        | 7.0        | 5.0        | 3.0        | 3.0        | 3.0        | 3.0        | 4.0        | 5.0        | 5.0        | 4.0        | 6.0        | 56.0          |
| Partly Cloudy Days                        | 13.0       | 12.0       | 14.0       | 14.0       | 17.0       | 17.0       | 19.0       | 18.0       | 18.0       | 16.0       | 14.0       | 14.0       | 184           |
| Cloudy Days                               | 10.0       | 9.0        | 12.0       | 13.0       | 11.0       | 9.0        | 10.0       | 9.0        | 7.0        | 10.0       | 12.0       | 11.0       | 125           |
| Percent of Possible<br>Sunshine           | 55.0       | 57.0       | 55.0       | 54.0       | 60.0       | 63.0       | 62.0       | 65.0       | 67.0       | 59.0       | 49.0       | 49.0       | 58.0          |
| Avg. Relative<br>Humidity                 | 65.5       | 73.5       | 71.5       | 71.5       | 71.0       | 70.5       | 71.0       | 71.0       | 71.5       | 72.0       | 74.0       | 74.5       | 73.0          |

## SECTION 2

### NATIONAL STATE AND LOCAL TRENDS AND COMMITMENTS

#### NATIONAL OIL DEPENDENCE

The United States consumed 18.8 million barrels per day of petroleum products during 2011, making us the world's largest petroleum consumer. Over half (52%) of U.S. petroleum imports come from the Western Hemisphere (North, South, and Central America, and the Caribbean including U.S. territories) during 2011. About 22% of our imports of crude oil and petroleum products came from the Persian Gulf countries of Bahrain, Iraq, Kuwait, Qatar, Saudi Arabia, and United Arab Emirates. Hawai'i's dependence on fossil fuels is not seen as sustainable and will ultimately lead to a negative outcome. Our largest sources of net crude oil and petroleum product imports were from Canada and Saudi Arabia<sup>5</sup>.

#### Top Sources of Net Crude Oil and Petroleum Product Imports:

Canada (29%)

Saudi Arabia (14%)

Venezuela (11%)

Nigeria (10%)

Mexico (8%)

#### STATE OF Hawai'i OIL DEPENDENCE AND THE CLEAN ENERGY INITIATIVE

Hawai'i is the most fossil fuel dependent state in the nation. The Hawai'i Clean Energy Initiative is a federal-state-private sector partnership with a goal of achieving 70% clean energy by 2030, with 30% from efficiency measures and 40% from locally generated renewable sources.

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<sup>5</sup> U.S. Energy Information Administration. July 13, 2012. Energy in Brief. How Dependent Are We On Foreign Oil?



Achievement of the clean energy goals is also expected to make Hawaii:

1. More independent and less reliant on other economies.
2. Achieve greater energy security.
3. Become more economically stable by keeping an estimated \$6 billion in state that would otherwise go toward foreign oil investments.
4. Have a new, greener economic sector that will counter-balance our reliance on tourism and the military.
5. Positioned as a worldwide leader in the clean energy category that will attract more business and expertise to the region.

#### KAUAI ISLAND UTILITY COOPERATIVE'S COMMITMENT TO CLEAN ENERGY

The Kauai Island Utility Cooperative (KIUC) is a not-for-profit generation, transmission and distribution electric cooperative owned and controlled by the members it serves. Headquartered in Lihue, Kauai, Hawaii, the cooperative currently serves more than 32,000 electric accounts throughout Kauai. Committed to reinventing how Kauai is powered, KIUC is aggressively pursuing diversification of its energy portfolio to include a growing percentage of hydropower, photovoltaic, bio-fuel, and biomass.

Act 234, Session Laws of Hawai‘i 2007 established a framework to reduce greenhouse gas emission levels to 1990 levels by 2020. Although not part of the HCEI agreement, KIUC is voluntarily participating in the clean energy initiative and has committed to an aggressive target of 50% renewables by 2023, thus exceeding the state HCEI goal.

## Hawai‘i 2050 SUSTAINABILITY PLAN

The 2005 Hawai‘i State Legislature created the Hawai‘i 2050 Sustainability Task Force, a group of 25 citizens with diverse backgrounds in planning, community, business, environment and government to develop the state’s first long range plan in 30 years.

After a two year community-based planning effort, the Hawai‘i 2050 Sustainability Task Force produced a report to the Legislature titled “*Hawai‘i 2050 Sustainability Plan, Charting a Course for Hawai‘i’s Sustainable Future.*”

The Hawai‘i 2050 Sustainability Plan produced the state’s first definition of sustainability as:

A Hawai‘i that achieves the following:’

- Respects the culture, character, beauty and history of our state’s island communities;
- Strikes a balance among economic, social and community, and environmental priorities; and
- Meets the needs of the present without compromising the ability of future generations to meet their own needs.

The five goals of Hawai‘i 2050 are:

1. Living sustainably is part of our daily practice in Hawai‘i.
2. Our diversified and globally competitive economy enables us to meaningfully live, work and play in Hawai‘i.
3. Our natural resources are responsibly and respectfully used, replenished and preserved for future generations.
4. Our community is strong, healthy, vibrant and nurturing, providing safety nets for those in need.
5. Our Kanaka Maoli and island cultures and values are thriving and perpetuated.

Community residents were pleased with the vision but also wanted to convey a sense of urgency in taking actions to becoming more sustainable. In response, the Task Force established the following priority actions for the year 2020 in these areas:

1. Increase affordable housing opportunities for households up to 140% of median income.
2. Strengthen public education.
3. Reduce reliance on fossil (carbon-based) fuels.
4. Increase recycling, reuse and waste reduction strategies.
5. Develop a more diverse and resilient economy.
6. Create a sustainability ethic.
7. Increase production and consumption of local foods and products, particularly agriculture.
8. Provide access to long-term care and elderly housing.
9. Preserve and perpetuate our Kanaka Maoli and island cultural values.

## GOVERNMENT OPERATIONS GREENHOUSE GAS EMISSIONS INVENTORY

This government operations GHG emissions inventory is the County's first step to creating a sustainability ethic as described in the Hawai'i Sustainability 2050 Plan and reduce our reliance on fossil fuels. In doing so, Kaua'i County's actions will also support the state's HCEI goals. This inventory provides a baseline where we can measure our progress as we move forward in making county government more sustainable. Government operations greenhouse gas emissions inventories include emissions from all county operations that it owns or controls. The most common sectors in a government operations inventory include buildings and facilities, streetlights/traffic signals, wastewater treatment plants, water delivery facilities, solid waste facilities, etc. The County of Kaua'i plans to document government operations to produce a carbon emissions inventory via this report and then plans to set emissions reduction targets and measure future progress via an Action Plan.

## SECTION 3

### KAUAI COUNTY EMISSIONS INVENTORY

#### DATA COLLECTION

Similar to many municipalities, the county's data sets are incomplete and could use major improvements. Add limited staff time and resources to that equation and one wonders how even the most simple emissions inventory is possible. Fortunately, County operations are not complex and most of the facilities' electrical use information is quite extensive due to assistance from the Kaua'i Island Utility Cooperative. Most of the data gaps were related to fuel use records, which, looking forward, are being addressed with the upcoming purchase of a new fuel management system. The County used bulk fuel purchases to calculate emissions due to fuel use for its initial carbon footprint report. Solid Waste landfill information obtained was also very good, due to ongoing monitoring required by EPA and State Dept. of Health regulations regarding landfills and the County's efforts at waste diversion and extensive recycling programs to prolong the life of the Kekaha landfill as officials move to site and plan a new landfill at a location to be determined on Kauai.

#### EMISSIONS REDUCTION STRATEGY

Although this government operations emissions inventory distills the data down to carbon dioxide equivalents (CO<sub>2</sub>e), most people do not relate to carbon emissions and CO<sub>2</sub>e equivalents. Most people understand kWh reductions or miles per gallon as it relates to cost per unit of electricity or cost per gallon of fuel because they deal with these measures on a daily basis. This report is specifically written for the lay person. Although the County intends to report greenhouse gas emissions related to county operations, we fully understand that it is important to present the data used to arrive at CO<sub>2</sub> equivalents so those county employees that can impact the baseline understand the relationship between greenhouse gas emissions and the more understandable metrics they can relate to.

#### GOVERNMENT OPERATIONS ENERGY AND CARBON EMISSIONS FOCUS AREAS

Local governments exercise direct control over their own actions that result in GHG emissions, and can significantly achieve GHG reductions and cost savings by internally reducing energy and fuel usage as well as the amounts of waste going to the landfill. In collecting data relating to government operations, the County looked at the following areas:

- Buildings and related facilities
- Streetlights and traffic signals
- Water facilities
- Wastewater facilities
- Solid Waste facilities, excluding Kekaha Landfill
- Vehicle fleet
- Transit fleet



- Employee commute

Many GHG inventory protocols classify emissions sources and activities as producing either direct or indirect GHG emissions. The GHG Protocol used by the County defines direct and indirect emissions as follows:

- Direct GHG emissions are emissions from sources that are owned or controlled by the County.
- Indirect GHG emissions are emissions that occur because of County actions, but the direct source of emissions is owned or controlled by a separate entity.

The GHG Protocol further categorizes these direct/indirect emissions into three broad scopes<sup>6</sup>:

- **Scope 1:** Direct emissions from sources within the County of Kaua'i's operations that it owns or controls. This includes direct GHG emissions, such as from County-owned vehicles.
- **Scope 2:** Indirect emissions associated with the consumption of electricity, heating, cooling or steam that is purchased from an outside utility.
- **Scope 3:** All other emissions sources that hold policy relevance to the local government that can be measured and reported. This includes all indirect emissions not covered in Scope 2 that occur as a result of activities within the operations of local government. Includes other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the County (employee commute), electricity-related activities (e.g. T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc.

Figure 2 below illustrates the different types of scopes used by the County to characterize the GHG emissions inventory results and target areas for reductions. This information also shows the areas where data collection improvements could occur to expand our tracking activities and identify opportunities to lower our carbon emissions. The County lacks sufficient compiled data to determine a lot of the Scope 3 emissions. These are areas of improvement where upgraded software and improved data collection protocols are needed.

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<sup>6</sup> ICLEI Local Governments for Sustainability. July 2011. Local Government Operations Greenhouse Gas Emissions Inventory Instructions. Part 1: Data Gathering and Quality Control of the Master Data Workbook.

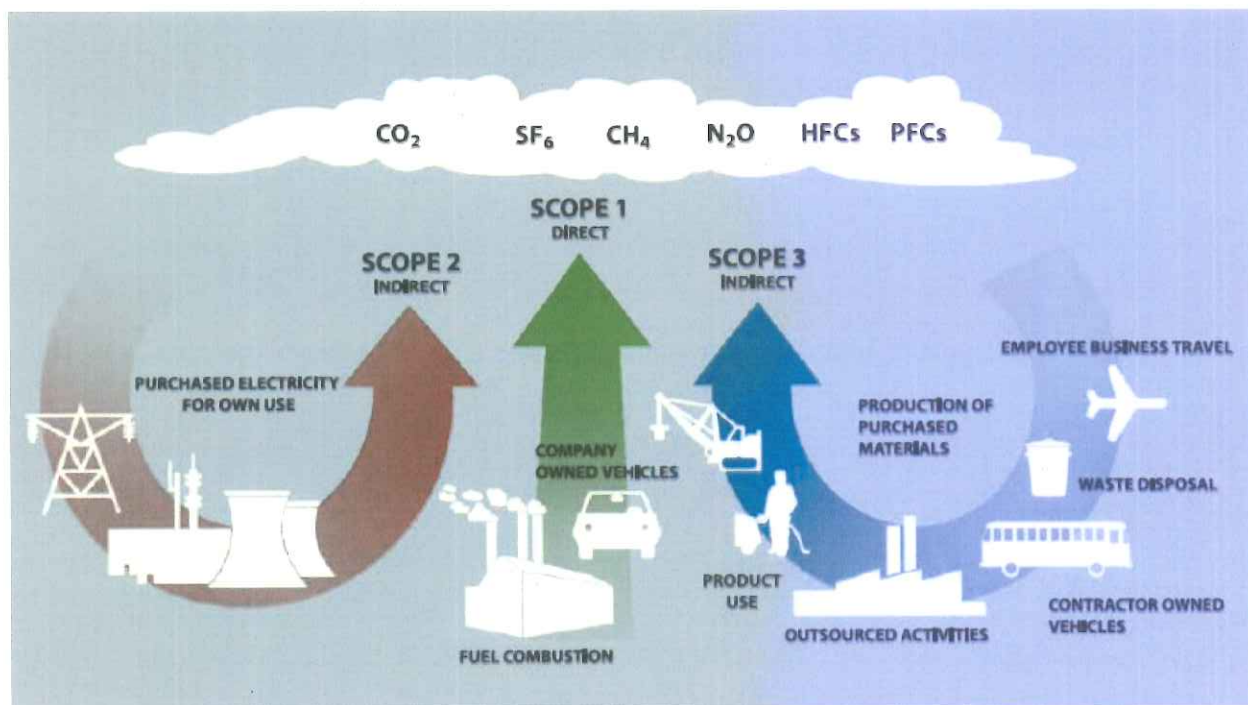


FIGURE 2: EMISSIONS BASED ON SCOPES AND EMISSIONS SOURCES

## COUNTY EMISSIONS BASELINE

The County's baseline year is Calendar Year 2007. In that year, County of Kaua'i operations produced an estimated 20,265 metric tons of CO<sub>2</sub>e from direct emissions, primarily from county-owned vehicles, indirect emissions from purchased electricity and indirect emissions from employee commutes.

**This inventory follows the emissions measurement protocol for local government operations that** has been consensually adopted by ICLEI and The Carbon Registry. The Emissions Inventory for the County of Kaua'i was produced by consultant Ken Stokes from Island Matters LLC using data collected by the Office of Economic Development and provided by the respective agencies and departments.

## OVERVIEW OF EMISSIONS INVENTORY RESULTS FOR THE COUNTY OF Kaua'i, 2007-2011

The County's emissions inventory quantifies the greenhouse gases generated by the usage of electricity and fuels in government operations. Commonly accepted emissions factors are

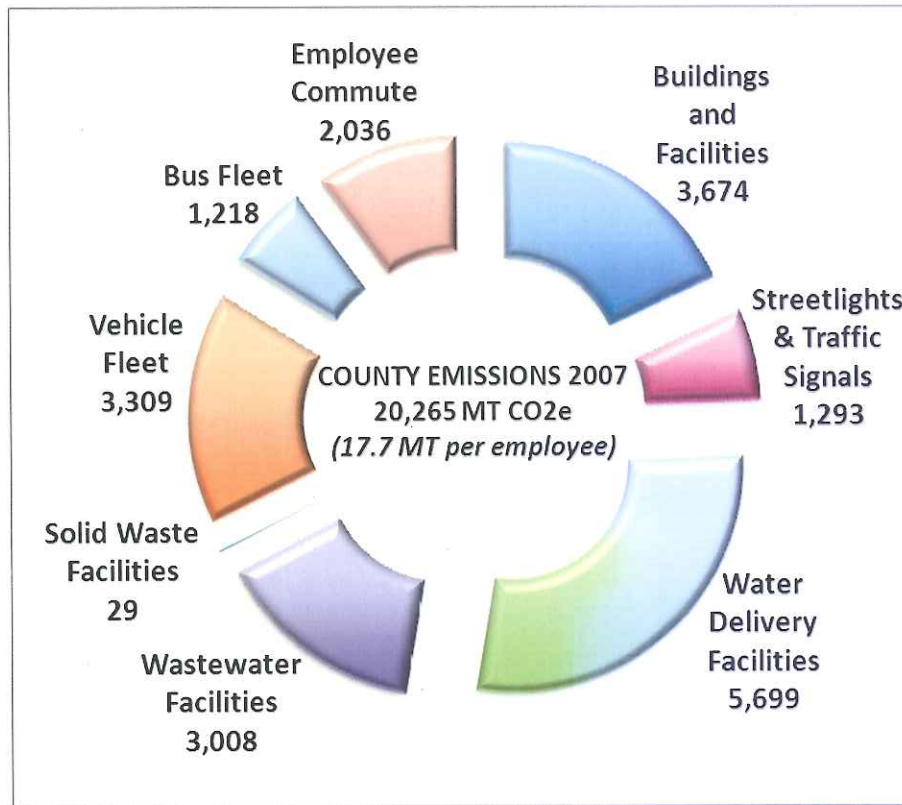


Figure 3: County of Kaua'i's Greenhouse Gas Emissions from Local Government Operations, 2007

associated with each kilowatt-hour (kWh) of electricity and gallon of gasoline or diesel fuel, and these amounts are tabulated for each major County government function and expressed in metric tons of carbon dioxide equivalents (MTCO<sub>2</sub>e).

In 2007, the County used a combined total of 19.8 gigawatt-hours of electricity and more than 700,000 gallons of fuel which generated a combined total of approximately 20,265 MTCO<sub>2</sub>e, which was distributed across government functions as shown in the pie chart above (Figure 3).

Comparable operations data was compiled for each of the following four years from the benchmarked year 2007 (when the State of Hawai'i updated its comprehensive emissions inventory).

Total county emissions climbed from 20,265 MTCO<sub>2</sub>e in 2007 to 21,234 MTCO<sub>2</sub>e in 2011, as shown in Summary Table A below. Complete Year 2007 to 2011 data and calculation methodologies are presented in Appendix 1.

### **SUMMARY TABLE A**

| Annual County Government Operating Emissions  |  |               |               |               |               |
|---|--|---------------|---------------|---------------|---------------|
|   |  |               |               |               |               |
|   | Metric Tons of Carbon Dioxide Equivalents (MTCO2e) |               |               |               |               |
|   | 2007   | 2008          | 2009          | 2010          | 2011          |
| <b>TOTAL EMISSIONS</b>  | <b>20,265</b>                                      | <b>19,679</b> | <b>19,338</b> | <b>19,400</b> | <b>21,234</b> |
| <b>BY SOURCE</b>  |  |               |               |               |               |
| Electricity   | 13,702   | 13,200        | 12,630        | 12,877        | 12,482        |
| Fuels   | 6,562  | 6,479         | 6,709         | 6,524         | 8,752         |
|   |  |               |               |               |               |
| <b>BY FUNCTION</b>  |  |               |               |               |               |
| Buildings and Facilities  | 3,674  | 3,850         | 3,669         | 3,596         | 3,694         |
| Streetlights & Traffic Signals  | 1,293  | 1,279         | 1,250         | 1,231         | 1,259         |
| Water Delivery Facilities   | 5,699  | 5,151         | 4,803         | 5,110         | 4,637         |
| Wastewater Facilities   | 3,008  | 2,896         | 2,886         | 2,913         | 2,865         |
| Solid Waste Facilities  | 29   | 23            | 22            | 27            | 27            |
| Vehicle Fleet   | 3,309  | 3,266         | 3,386         | 3,171         | 5,081         |
| Bus Fleet   | 1,218  | 1,308         | 1,415         | 1,486         | 1,759         |
| Employee Commute  | 2,036  | 1,905         | 1,908         | 1,867         | 1,912         |
| <b>PER EMPLOYEE</b>   |  |               |               |               |               |
| FTE Employees   | 1,142  | 1,139         | 1,217         | 1,196         | 1,241         |
| <b>MTCO2e/FTE</b>   | <b>17.7</b>  | <b>17.3</b>   | <b>15.9</b>   | <b>16.2</b>   | <b>17.1</b>   |
|   |  |               |               |               |               |
| * Full-Time Equivalent employees as reported in the County's Comprehensive Annual Financial Report (CAFR) |  |               |               |               |               |

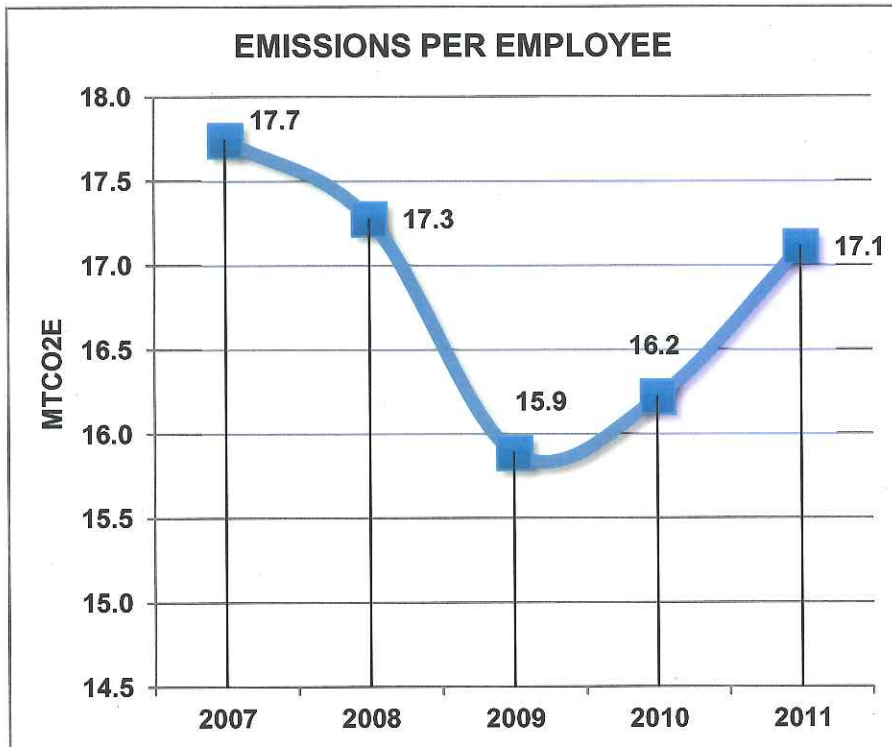


Figure 4: Emissions Per Employee, 2007-2011

On a per-employee basis, County emissions have ranged between 16 and 18 MTCO2e over this five year period as shown in Figure 4 above.

The emissions trend chart (on page 20) shows the trends for electricity and fuel as well as the emissions sources by government function. A detailed table of emissions is provided for each year (pages 27 to 31).

A comparison of emission sources for 2007 and 2011 are provided in Figure 5 below and the trends for electricity and fuel purchases for these same periods are illustrated in Figure 6 below.

Specific annual breakdowns are provided in the emissions tables below.



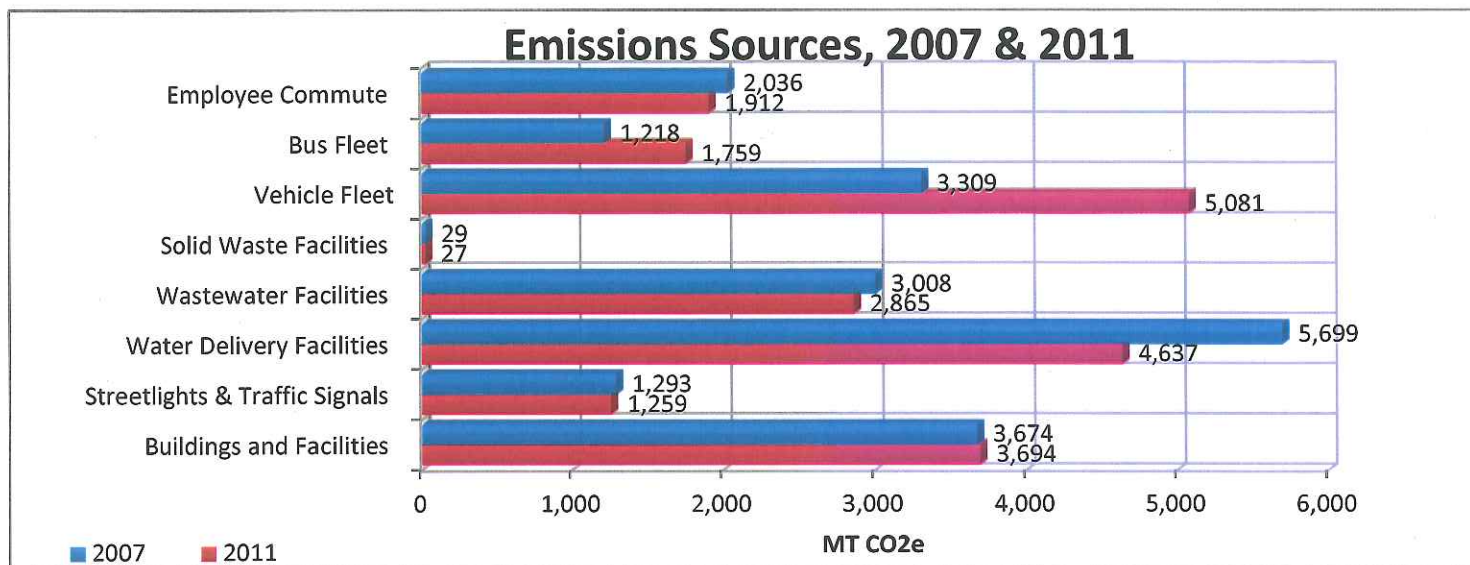


FIGURE 5

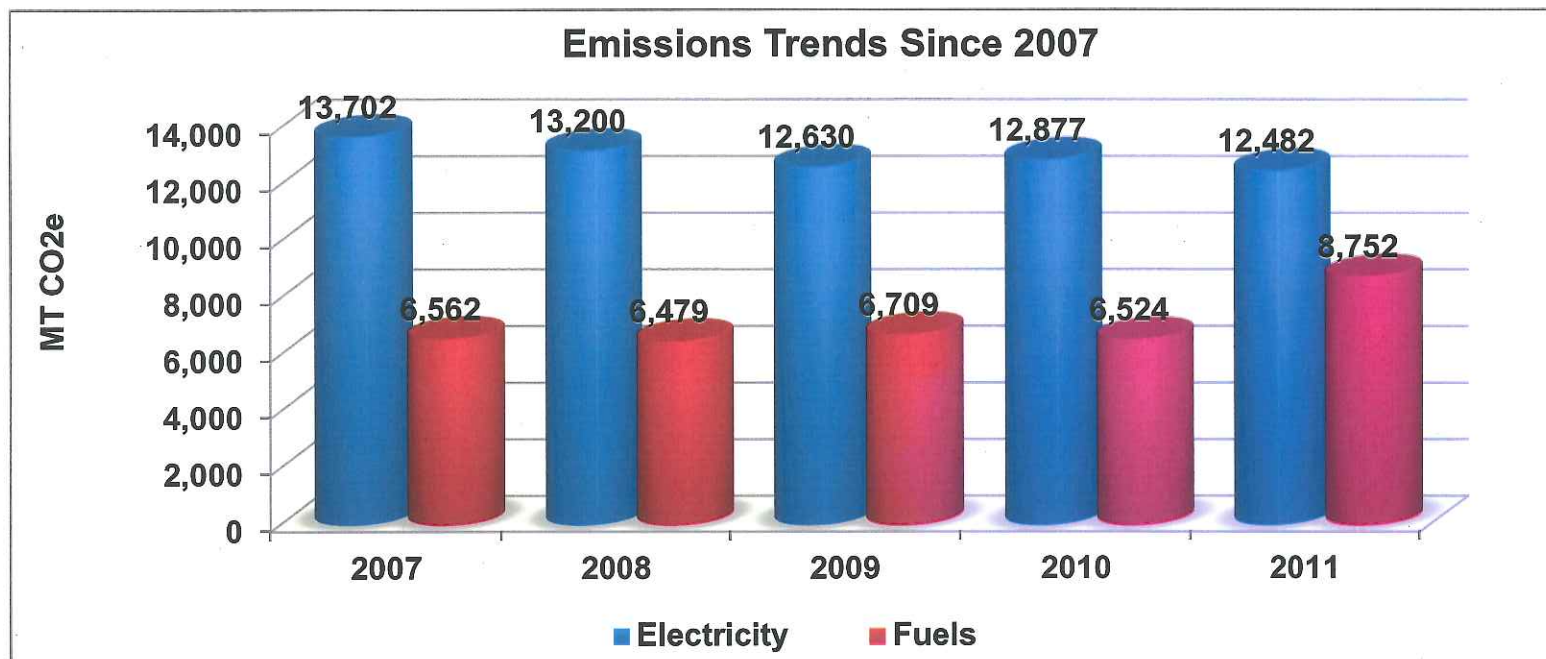


FIGURE 6

## IMPORTANT 2007 BASELINE YEAR FINDINGS

1. The County of Kaua'i Government Operations was responsible for 20,265 metric tons of CO<sub>2</sub>e primarily from direct emissions from county-owned vehicles; and indirect emissions from purchased electricity from KIUC; and indirect emissions from employee commutes in CY 2007, equivalent to 47,128 barrels of oil<sup>7</sup>. Government emissions by sector is presented in Figure 7 below.
2. The largest source of direct GHG emissions (Scope 1) comes from the County's vehicle fleet.
3. The County spent over \$7.1 million dollars on electricity in CY 2007, representing over 19.7 million kWh of electricity, generating 13,702 metric tons of Scope 2 (indirect) CO<sub>2</sub>e. Indirect emissions from County facilities accounted for 67.6% of GHG emissions.
4. The largest departmental source of indirect Scope 2 GHG emissions (of the total 67.6%) comes from the Department of Water operations, accounting for 5,699 metric tons of CO<sub>2</sub>e, representing 28.1% of total local government indirect Scope 2 emissions.

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<sup>7</sup> EPA (2007). [Inventory of U.S. Greenhouse Gas Emissions and Sinks: Fast Facts 1990–2005. Conversion Factors to Energy Units \(Heat Equivalents\) Heat Contents and Carbon Content Coefficients of Various Fuel Types](#). U.S. Environmental Protection Agency, Washington, DC. USEPA #430-F-07-002 (PDF) (2 pp, 190K, [About PDF](#)).

EPA (2010). [Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008. Annex 2 \(Methodology for estimating CO<sub>2</sub> emissions from fossil fuel combustion\)](#), P. A-58. U.S. Environmental Protection Agency, Washington, DC. U.S. EPA #430-R-10-006 (PDF) (407 pp, 19MB, [About PDF](#)).

IPCC (2006). [2006 IPCC Guidelines for National Greenhouse Gas Inventories](#). Intergovernmental Panel on Climate Change, Geneva, Switzerland.



## Government Operations Emissions by Sector, CY 2007 (Percent)

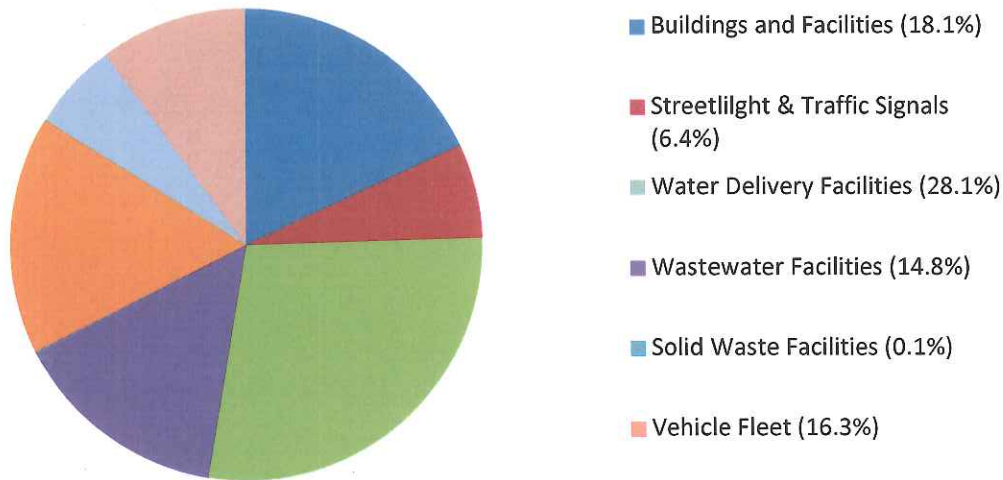


FIGURE 7

### Buildings and Facilities

The County owns, manages and maintains over 100 buildings and facilities with approximately 700,000 square feet of space to support county operations. Combined, in 2007, these facilities used 5,303,813 kWh of electricity at a cost of \$1,911,063. The electricity used translated into the release of 3,674 metric tons of CO<sub>2</sub>e. Buildings and facilities constitute 18.1% of total emissions. The County does not self-generate any electricity using fossil fuels.

### Streetlights and Traffic Signals

KIUC owns and maintains over 2,900 streetlights and traffic signals along County roadways but the streetlight bill is paid for by the County. The vast majority of streetlights are 100 watt high pressure sodium lamps with some 150 and 250 watt lamps at street intersections. In CY 2007, the County's streetlight and traffic signals used 1,865,960 kWh of electricity which cost \$908,632. Traffic signals make up 6.4% of total emissions.

### Water Delivery Facilities

The Kaua'i County Department of Water is a semi-autonomous agency that monitors, operates, and maintains 50 deep well pumping stations, 19 booster pumping stations along with its associated electrical motor control centers and chlorination disinfection equipment, 4 tunnel

sources, 58 storage tanks, 75 control valve stations, and over 400+ miles of pipeline to approximately 20,000 consumer water service connections and meters.

All functions necessary to collect, treat, and distribute potable water from the source to the tap are performed by the Department's staff of 75, as well as most support functions, including accounting, billing, customer service, engineering, planning and procurement. The Department operates as a semi-autonomous enterprise department of the County of Kauai, under the direction of the Board of Water Supply. The Department derives all of its revenue from water sales with no direct subsidy from, or contributions to the County General Fund.

In CY 2007, the Water Dept. spent \$2,887,419 by consuming 8,227,745 kWh of electricity, which contributed to 5,699 metric tons of CO<sub>2</sub>e emissions from water operations. The Department spent \$2,887,419 for electricity costs. Water delivery facilities account for 28.1% of total emissions.

#### Wastewater Delivery Facilities

The Division of Wastewater Management under the Department of Public Works manages and administers the sewer user charge system, review subdivision construction plans and non-residential building permit plans where municipal service is available. The Wastewater Division also operates, maintains and repairs all County wastewater collection, treatment and disposal facilities in order to provide consistent and reliable performance to protect health and the environment. There are four main wastewater treatment facilities located at Wailua, Līhu'e, 'Ele'ele and Waimea. The four facilities and related infrastructure were responsible for the release of over 3,000 metric tons of CO<sub>2</sub>e in CY2007 from the consumption of 4,342,410 kWh of electricity at a cost of \$1,397,946. Wastewater delivery facilities account for 14/8% of total emissions.

#### Solid Waste Facilities

The Division of Solid Waste under the Department of Public works has offices at the Līhu'e Civic Center and the Kaua'i Resource Center. Solid Waste facilities account for only 0.1% of total emissions from purchased electricity. At this time, the County does not have sufficient data to calculate the collection and disposal of waste generated from county operations, which would fall under Scope 3, indirect sources of CO<sub>2</sub>e.

#### Vehicle Fleet

The County and the Department of Water owns and operates approximately 418 vehicles, including a mix of cars, trucks, vans, specialized vehicles such as police cars and fire trucks, and construction-related equipment such as loaders, backhoes, mowers, etc. The County and Dept.

of Water spent \$1,102,394 for 349, 149 gallons of diesel and gasoline. The County and Dept. of Water's vehicle fleet accounted for 16.3% of total emissions.

#### Transit Fleet

The County's Transportation Agency provides both public bus service and specialized door-to-door para-transit service. In 2007-2008, the transit fleet consisted of 43 buses, 4 vans and 4 cars, contributing 1,218 metric tons of CO<sub>2</sub>e from the use of 119,280 gallons of primarily diesel and some gas. Fuel costs totaled \$374,172. The County's bus transit fleet accounted for 6% of total emissions.

#### Employee Commute

An employee commute survey was distributed and completed in 2011 by 284 employees or 23% of the total workforce. The survey showed that the average employee drives 80 miles per week. 88% used their own car, 7% carpooled, 4% rode the bus and 1% participated in Park 'n Ride. The 80 miles per week driving information was used to determine that employee commute accounted for 2,036 metric tons of CO<sub>2</sub>e emissions or 10.1% of total county operations emissions.

## SECTION 4

### SUSTAINABILITY EFFORTS AND CLIMATE ACTION AT THE COUNTY OF KAUAI

The County of Kauaʻi has committed to increasing efficiencies within all of its operations to reduce operational costs; instilling a higher level of pride and satisfaction for all county government staff; becoming a leader in sustainable practices; and making a contribution to reducing the impacts of greenhouse gas emissions.

Specific actions taken or underway by the County include:

- Installation of photovoltaic energy systems at the Līhuʻe Civic Center, Kaiākea Fire Station and the Waimea Wastewater Treatment Facility.
- Commencement of an Energy Savings Performance Contract for the Eleele Wastewater Treatment Facility, the Līhuʻe Wastewater Treatment Facility and the Wailua Wastewater Treatment Facility.
- Development of an Energy Savings Performance Contract Request for Proposal for Dept. of Public Works, Building Division and Dept. of Parks and Recreation facilities.
- Expanded recycling and source reduction programs for county employees.
- Installation of LED linear tube lamps replacing fluorescent lamps in 24/7 security lighting at the Līhuʻe Civic Center.
- Procurement of fuel efficient hybrid gas/electric vehicles to replace older model gas only vehicles.
- Procurement of 5 Nissan Leaf all-electric vehicles and installation of 10 EV charging stations at county facilities.
- Paper reduction campaign.
- Disposables to reusables campaign to reduce or eliminate the use of disposable plates, cups and utensils in county offices.
- Office refrigerator replacement campaign, targeting the worst energy users determined by metering.
- Vehicle Miles Traveled reduction program to get more staff members to ride the Kauaʻi Bus and to carpool or rideshare.
- Having 3 county employees receiving Certified Energy Manager certificates.

The County has also solidified its commitment to sustainability by hiring its first sustainability manager in September 2011 to develop a comprehensive county operations sustainability program using this government inventory of greenhouse gas emissions, formation of a staff-level sustainability Green Team and coordination and awareness of sustainability projects across all county agencies.

Energy is recognized as a key sector of the sustainability program and the County's Energy Coordinator position was moved from unreliable annual grant funding to more secure and stable county general funds. This administrative commitment now enables multi-year energy efficiency and renewable energy projects and programs to be developed.

APPENDIX 1

COUNTY OF Kaua'i EMISSIONS

CY 2007-2011

## METHODOLOGY FOR EMISSIONS CALCULATIONS

This inventory follows the emissions measurement protocol for local government operations that has been consensually adopted by ICLEI and The Carbon Registry.

County emissions due to electricity and fuel use were calculated in a three-step process, as follows:

- 1) **Compile** annual operations data on electricity (*kWh*) and fuels (*gallons of gasoline and diesel*) usage by County departmental facilities and vehicles, and estimate fuel usage in workforce commuting.
- 2) **Tabulate** by function, including:
  - a) buildings and facilities
  - b) streetlights and traffic signals
  - c) water delivery
  - d) wastewater management
  - e) solid waste management
  - f) mass transit vehicles
  - g) fleet vehicles
  - h) workforce commute
- 3) **Multiply** by the emissions factors, including:
  - a) electricity emissions in pounds of CO<sub>2</sub>e per kWh
  - b) fuels emissions in pounds of CO<sub>2</sub>e per gallon

# COUNTY OF KAUAI EMISSIONS

2007

|                                 | Cost                | kWh<br>Energy Use | Gallons<br>Fuel Use | Metric<br>Tons<br>CO2e | Share of<br>Emissions |
|---------------------------------|---------------------|-------------------|---------------------|------------------------|-----------------------|
| Buildings and Facilities        | \$1,911,063         | 5,303,813         |                     | 3,674                  | 18.1%                 |
| Streetslights & Traffic Signals | \$908,632           | 1,865,960         |                     | 1,293                  | 6.4%                  |
| Water Delivery Facilities       | \$2,887,419         | 8,227,745         |                     | 5,699                  | 28.1%                 |
| Wastewater Facilities           | \$1,397,946         | 4,342,410         |                     | 3,008                  | 14.8%                 |
| Solid Waste Facilities          | \$20,422            | 42,079            |                     | 29                     | 0.1%                  |
| <b>Facilities Energy</b>        | <b>\$7,125,481</b>  | <b>19,782,007</b> |                     | <b>13,702</b>          | <b>67.6%</b>          |
| <b>Vehicle Fleet**</b>          | <b>\$1,102,394</b>  |                   | <b>349,149</b>      | <b>3,309</b>           | <b>16.3%</b>          |
| ACD* Gsl                        | \$487,446           |                   | 155,375             | 1,364                  | 6.7%                  |
| ACD* Dsl                        | \$470,016           |                   | 159,371             | 1,627                  | 8.0%                  |
| BWS* Gsl                        | \$70,228            |                   | 23,813              | 209                    | 1.0%                  |
| BWS* Dsl                        | \$74,705            |                   | 10,591              | 108                    | 0.5%                  |
| <b>Bus Fleet</b>                | <b>\$374,172</b>    |                   | <b>119,280</b>      | <b>1,218</b>           | <b>6.0%</b>           |
| TA* Gsl                         | \$547               |                   | 186                 | 2                      | 0.0%                  |
| TA* Dsl                         | \$373,625           |                   | 119,094             | 1,216                  | 6.0%                  |
| <b>Employee Commute ***</b>     | <b>\$683,853</b>    |                   | <b>231,878</b>      | <b>2,036</b>           | <b>10.1%</b>          |
| <b>TOTAL</b>                    | <b>\$10,762,467</b> | <b>19,782,007</b> | <b>700,307</b>      | <b>20,265</b>          | <b>100.0%</b>         |

\*ACD = All County Departments; BWS = Board of Water Supply; TA = Transportation Agency; Gsl = gasoline; Dsl = Diesel

\*\*Estimated calculation based on best available information. Vehicle fleet includes Board of Water Supply

\*\*\* Assumes 19.7 MPG average at \$2.95/gal for 1,142 employees commuting 80 mi/wk average



# COUNTY OF KAUAI EMISSIONS

2008

|                                 | Cost                | kWh<br>Energy Use | Gallons<br>Fuel Use | Metric<br>Tons<br>CO2e | Share of<br>Emissions |
|---------------------------------|---------------------|-------------------|---------------------|------------------------|-----------------------|
| Buildings and Facilities        | \$2,549,530         | 5,657,458         |                     | 3,850                  | 19.1%                 |
| Streetslights & Traffic Signals | \$1,084,879         | 1,879,996         |                     | 1,279                  | 6.5%                  |
| Water Delivery Facilities       | \$3,566,496         | 7,569,430         |                     | 5,151                  | 25.0%                 |
| Wastewater Facilities           | \$1,744,253         | 4,255,954         |                     | 2,896                  | 15.0%                 |
| Solid Waste Facilities          | \$20,273            | 34,175            |                     | 23                     | 0.1%                  |
| <b>Facilities Energy</b>        | <b>\$8,965,431</b>  | <b>19,397,013</b> |                     | <b>13,200</b>          | <b>65.7%</b>          |
| <b>Vehicle Fleet**</b>          | <b>\$1,286,243</b>  |                   | <b>343,872</b>      | <b>3,266</b>           | <b>17.6%</b>          |
| ACD* Gsl                        | \$602,270           |                   | 147,799             | 1,298                  | 6.4%                  |
| ACD* Dsl                        | \$513,527           |                   | 160,438             | 1,638                  | 9.5%                  |
| BWS* Gsl                        | \$74,984            |                   | 23,427              | 206                    | 0.8%                  |
| BWS* Dsl                        | \$95,462            |                   | 12,209              | 125                    | 0.9%                  |
| <b>Bus Fleet</b>                | <b>\$521,936</b>    |                   | <b>128,167</b>      | <b>1,308</b>           | <b>7.4%</b>           |
| TA* Gsl                         | \$1,224             |                   | 382                 | 3                      | 0.1%                  |
| TA* Dsl                         | \$520,712           |                   | 127,785             | 1,305                  | 7.3%                  |
| <b>Employee Commute ***</b>     | <b>\$694,418</b>    |                   | <b>216,952</b>      | <b>1,905</b>           | <b>9.3%</b>           |
| <b>TOTAL</b>                    | <b>\$13,276,207</b> | <b>19,397,013</b> | <b>688,992</b>      | <b>19,679</b>          | <b>100.0%</b>         |

\*ACD = All County Departments; BWS = Board of Water Supply; TA = Transportation Agency; Gsl = gasoline; Dsl = Diesel

\*\*Estimated calculation based on best available information. Vehicle fleet includes Board of Water Supply

\*\*\* Assumes 21.0 MPG average at \$3.20/gal for 1,139 employees commuting 80 mi/wk average

**COUNTY OF KAUA'I EMISSIONS  
2009**

|                                | <b>Cost</b>        | <b>kWh</b>        | <b>Gallons</b>  | <b>Metric</b> | <b>Share of</b>  |
|--------------------------------|--------------------|-------------------|-----------------|---------------|------------------|
|                                |                    | <b>Energy Use</b> | <b>Fuel Use</b> | <b>Tons</b>   | <b>Emissions</b> |
|                                | \$1,724,064        | 5,564,992         |                 | 3,669         | 19.0%            |
| Buildings and Facilities       | \$832,241          | 1,895,986         |                 | 1,250         | 6.5%             |
| Streetlights & Traffic Signals | \$2,206,295        | 7,284,685         |                 | 4,803         | 24.8%            |
| Water Delivery Facilities      | \$1,176,708        | 4,376,871         |                 | 2,886         | 14.9%            |
| Wastewater Facilities          | \$15,647           | 33,724            |                 | 22            | 0.1%             |
| Solid Waste Facilities         |                    |                   |                 |               |                  |
| <b>Facilities Energy</b>       | <b>\$5,954,956</b> | <b>19,156,258</b> |                 | <b>12,630</b> | <b>65.3%</b>     |
| <b>Vehicle Fleet**</b>         | <b>\$957,750</b>   |                   | <b>353,730</b>  | <b>3,386</b>  | <b>17.5%</b>     |
| ACD* Gsl                       | \$387,574          |                   | 139,944         | 1,229         | 6.4%             |
| ACD* Dsl                       | \$472,328          |                   | 177,992         | 1,817         | 9.4%             |
| BWS* Gsl                       | \$47,878           |                   | 18,043          | 158           | 0.8%             |
| BWS* Dsl                       | \$49,969           |                   | 17,751          | 181           | 0.9%             |
| <b>Bus Fleet</b>               | <b>\$384,255</b>   |                   | <b>138,819</b>  | <b>1,415</b>  | <b>7.3%</b>      |
| TA* Gsl                        | \$4,622            |                   | 1,742           | 15            | 0.1%             |
| TA* Dsl                        | \$379,633          |                   | 137,077         | 1,400         | 7.2%             |
| <b>Employee Commute ***</b>    | <b>\$576,695</b>   |                   | <b>217,321</b>  | <b>1,908</b>  | <b>9.9%</b>      |
| <b>TOTAL</b>                   | <b>\$9,215,659</b> | <b>19,156,258</b> | <b>709,869</b>  | <b>19,338</b> | <b>100.0%</b>    |

\*ACD = All County Departments; BWS = Board of Water Supply; TA = Transportation Agency; Gsl = gasoline; Dsl = Diesel

\*\*Estimated calculation based on best available information. Vehicle fleet includes Board of Water Supply

\*\*\* Assumes 22.4 MPG average at \$2.65/gal for 1,217 employees commuting 80 mi/wk average

**COUNTY OF KAUAI EMISSIONS  
2010**

|                                | Cost                | kWh<br>Energy Use | Gallons<br>Fuel Use | Metric<br>Tons<br>CO2e | Share of<br>Emissions |
|--------------------------------|---------------------|-------------------|---------------------|------------------------|-----------------------|
| Buildings and Facilities       | \$3,031,744         | 5,555,972         |                     | 3,596                  | 18.5%                 |
| Streetlights & Traffic Signals | \$804,823           | 1,901,871         |                     | 1,231                  | 6.3%                  |
| Water Delivery Facilities      | \$2,979,556         | 7,895,009         |                     | 5,110                  | 26.3%                 |
| Wastewater Facilities          | \$1,472,145         | 4,500,907         |                     | 2,913                  | 15.0%                 |
| Solid Waste Facilities         | \$21,221            | 41,756            |                     | 27                     | 0.1%                  |
| <b>Facilities Energy</b>       | <b>\$8,309,488</b>  | <b>19,895,515</b> |                     | <b>12,877</b>          | <b>66.4%</b>          |
| <b>Vehicle Fleet**</b>         | <b>\$1,129,754</b>  |                   | <b>331,799</b>      | <b>3,171</b>           | <b>16.3%</b>          |
| ACD* Gsl                       | \$421,516           |                   | 125,876             | 1,105                  | 5.7%                  |
| ACD* Dsl                       | \$539,265           |                   | 165,611             | 1,691                  | 8.7%                  |
| BWS* Gsl                       | \$83,304            |                   | 25,583              | 225                    | 1.2%                  |
| BWS* Dsl                       | \$85,669            |                   | 14,728              | 150                    | 0.8%                  |
| <b>Bus Fleet</b>               | <b>\$487,949</b>    |                   | <b>145,764</b>      | <b>1,486</b>           | <b>7.7%</b>           |
| TA* Gsl                        | \$5,786             |                   | 1,777               | 16                     | 0.1%                  |
| TA* Dsl                        | \$482,163           |                   | 143,987             | 1,470                  | 7.6%                  |
| <b>Employee Commute ***</b>    | <b>\$692,343</b>    |                   | <b>212,622</b>      | <b>1,867</b>           | <b>9.6%</b>           |
| <b>TOTAL</b>                   | <b>\$12,237,237</b> | <b>19,895,515</b> | <b>690,184</b>      | <b>19,400</b>          | <b>100.0%</b>         |

\*ACD = All County Departments; BWS = Board of Water Supply; TA = Transportation Agency; Gsl = gasoline; Dsl = Diesel

\*\*Estimated calculation based on best available information. Vehicle fleet includes Board of Water Supply

\*\*\* Assumes 22.5 MPG average at \$3.26/gal for 1,196 employees commuting 80 mi/wk average



**COUNTY OF KAUAI EMISSIONS  
2011**

|                                | Cost                | kWh<br>Energy Use | Gallons<br>Fuel Use | Metric<br>Tons<br>CO2e | Share of<br>Emissions |
|--------------------------------|---------------------|-------------------|---------------------|------------------------|-----------------------|
|                                |                     |                   |                     |                        |                       |
| Buildings and Facilities       | \$2,450,572         | 5,703,603         |                     | 3,694                  | 17.4%                 |
| Streetlights & Traffic Signals | \$783,640           | 1,943,899         |                     | 1,259                  | 5.9%                  |
| Water Delivery Facilities      | \$3,157,292         | 7,159,438         |                     | 4,637                  | 21.8%                 |
| Wastewater Facilities          | \$1,733,676         | 4,422,579         |                     | 2,865                  | 13.5%                 |
| Solid Waste Facilities         | \$24,597            | 41,526            |                     | 27                     | 0.1%                  |
| <b>Facilities Energy</b>       | <b>\$8,149,777</b>  | <b>19,271,045</b> |                     | <b>12,482</b>          | <b>58.8%</b>          |
| <b>Vehicle Fleet**</b>         | <b>\$2,159,052</b>  |                   | <b>520,234</b>      | <b>5,081</b>           | <b>23.9%</b>          |
| ACD* Gsl                       | \$563,115           |                   | 143,079             | 1,256                  | 5.9%                  |
| ACD* Dsl                       | \$1,447,269         |                   | 341,968             | 3,491                  | 16.4%                 |
| BWS* Gsl                       | \$77,032            |                   | 18,202              | 160                    | 0.8%                  |
| BWS* Dsl                       | \$71,636            |                   | 16,985              | 173                    | 0.8%                  |
| <b>Bus Fleet</b>               | <b>\$679,114</b>    |                   | <b>172,458</b>      | <b>1,759</b>           | <b>8.3%</b>           |
| TA* Gsl                        | \$5,294             |                   | 1,251               | 11                     | 0.1%                  |
| TA* Dsl                        | \$673,820           |                   | 171,208             | 1,748                  | 8.2%                  |
| <b>Employee Commute ***</b>    | <b>\$921,427</b>    |                   | <b>217,719</b>      | <b>1,912</b>           | <b>9.0%</b>           |
| <b>TOTAL</b>                   | <b>\$14,747,535</b> | <b>19,271,045</b> | <b>910,411</b>      | <b>21,234</b>          | <b>100.0%</b>         |

\*ACD = All County Departments; BWS = Board of Water Supply; TA = Transportation Agency; Gsl = gasoline; Dsl = Diesel

\*\*Estimated calculation based on best available information. Vehicle fleet includes Board of Water Supply

\*\*\* Assumes 22.8 MPG average at \$4.23/gal for 1,241 employees commuting 80 mi/wk average

## METHODOLOGY FOR EMISSIONS CALCULATIONS

This inventory follows the emissions measurement protocol for local government operations that has been consensually adopted by ICLEI and The Carbon Registry.

County emissions due to electricity and fuel use were calculated in a three-step process, as follows:

- 1) **Compile** annual operations data on electricity (*kWh*) and fuels (*gallons of gasoline and diesel*) usage by County departmental facilities and vehicles, and estimate fuel usage in <sup>\*\*</sup>workforce commuting.
- 2) **Tabulate** by function, including:
  - a) buildings and facilities
  - b) streetlights and traffic signals
  - c) water delivery
  - d) wastewater management
  - e) solid waste management
  - f) mass transit vehicles
  - g) fleet vehicles
  - h) workforce commute
- 3) **Multiply** by the emissions <sup>\*\*\*</sup>factors, including:
  - a) electricity emissions in pounds of CO<sub>2</sub>e per kWh
  - b) fuels emissions in pounds of CO<sub>2</sub>e per gallon